TABLE OF CONTENTS

1-5

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

I.

II.		EXECUTIVE SUMMARY	6-34
III.		INTRODUCTION, HISTORY, CURRENT ORGANIZATION, AND PRACTICE OF MOSQUITO CONTROL IN MASSACHUSETTS	35-97
	A.	 Legislation and Regulation Overview State Laws M.G.L. Chapter 252 as currently amended - Improvement of Lowlands. M.G.L. Ch. 132B Pesticide Control Act (From the Code of Massachusetts Regulations 333 CMR 2.00 -10.00) 333 CMR 10.03 (21-23) - Amendments of 1983. M.G.L., Chapter 91. Sections 1-63 Waterways M.G.L., Chapter 40. Section 5 - Boards of Health and Supervision. M.G.L., Chapter 131. Section 40 - Wetlands Protection Act. Section 40A of Chapter 131. Inland Wetlands Restriction Act. Section 105 of Chapter 130. Coastal Wetlands Restriction Act. M.G.L., Chapter 131A. Massachusetts Endangered Species Act. M.G.L., Chapter 132A. Sections 13-16, 18 of Ocean and Coastal Sanctuaries Act j. Acts of Enabling Legislation Establishing Mosquito Control Projects Federal Laws Section 401. Clean Water Act: Water Quality Certification. Section 404. Clean Water Act: Water Quality Certification. 	
		b. Section 404. Clean Water Act (1972).c. Endangered Species Act.	
	В.	Current Mosquito Control Programs in Massachusetts 1. Formal Mosquito Control Projects 2. Non-Member Communities. 3. Other Programs a. Department of Environmental Management b. Department of Public Health c. Federal Lands d. Private Reserves.	
	C.	Historical Overview of Mosquito Control Practices in Massachusetts 1. Practices prior to 1980	
	D.	 Transitioning: from 1980 to 1995. Current Mosquito Control Strategies in Massachusetts Overview Current Practice a. Saltmarsh Mosquitoes b. Inland Freshwater Wetlands c. Irrigated and Other Man-Made Reflood Habitats d. Urban Habitats 	
	D	 3. Current Policies a. Requests for Control b. Documentation for Control Implementation c. Selection of Control Strategies d. Evaluation of Efficacy e. Public Participation 	
	E.	Eastern Equine Encephalitis 1. Responsibility for Surveillance and Control. 2 Effect of EEE on Projects	

A. Mosquito Species

- 1. General biology of Massachusetstts mosquitoes
- 2. Salt marsh mosquitoes
- 3. Freshwater mosquitoes
 - a. Aedes canadensis
 - b. Aedes vexans
 - c. Additional Aedes species
 - d. Culex species
 - e. Culiseta species
 - f. Coquillettidea perturbans
 - g. Other freshwater species

B. Habitats in which mosquito control takes place

- 1. Coastal Wetlands
 - a. Marine
 - b. Brackish
- 2. Inland Wetlands
- 3. Surface Water Bodies
 - a. Lakes and Ponds
 - b. Rivers and Streams
- 4. Recharge Areas
 - a. Wetland
 - b. Upland
- 5. Upland Areas
- Agricultural Areas, with emphasis or sensitive areas such as apiaries and organic farms.
- 7. Sensitive environments
 - a. Urban
 - b. Recreation
 - c. Sensitive individuals
 - d. Public and Private Wildlfie Refuges and Conservation Areas
 - e. ACEC and areas with rare or endangered species
 - f. Water supplies
- C. Mosquitoes as disease vectors.
 - 1. Easten Equine Encephalitis
 - 2. California Encephalitis vectors
 - 3. Dog heartworm

V. CURRENT ABATEMENT STRATEGIES AND THEIR IMPACTS

117-219

A. Chemical Control

- 1. Overview of Chemical Control
 - a. General Toxicity of Pesticides
 - b. Pesticides used for Mosquito Control in Massachusetts
 - c. General Properties of Registered Mosquito Control Insecticides in Massachusetts, 1996
 - d. Pesticide Handling and Application
- 2. Larvicides
 - a. Biologicals: Bti and B. sphaericus
 - b. Methoprene
 - c. Oils
 - d. Others
- 3. Adulticides
 - a. Pyrethrum and Synthetic Pyrethroids

	b. Malathion	
B.	Biological Control.	
	1. Introduction	
	2. Predators	
	a. Introduction	
	b. Vertebrate predators	
	c. Invertebrate predators	
	3. Parasites and Pathogens	
	a. mermithid nematode parasites	
	b. Microsporidia	
	c. Fungal Pathogens	
	c. Bacterial pathogens	
	d. Viral Pathogens	
	4. Pest Species Manipulation	
	a. Sterile Insect Technique	
	b. Incompatibility	
	c. Chromosomal Aberrations	
	d. Competitive Displacement	
	5. Other Control Approaches	
	a. Trap out techniques.	
	b. Repellents.	
C.	Physical Control	
	1. Types of Habitat Modification	
	a. Open marsh water management (OMWM)	
	b. Other Modification Strategies	
	c. origination of Requests for Physical Control	
	2. Ecosystem changes of non-target biota as a result of physical controls.	
	a. Salt Marsh .	
	b. Freshwater Wetlands (exclusive of Vernal Pools)	
	c. Vernal Pools.	
Б	d. Rare and Endangered Species.	
	Food Web Effects of Mosquito Control	
E.	No Program	
VI.	MOSQUITO CONTROL INTEGRATED PEST MANAGEMENT	220-236
A.	Definition of IPM as it relates to mosquito control	
В.		
		227 244
VII.	STANDARDS FOR MOSQUITO CONTROL	237-244
A.	General policy regarding standard mosquito-control procedures	
В.	$\boldsymbol{\varepsilon}$	
	1. Larval Mosquito Populations	
	a. Larval indentification	
	b. Pre-control larval monitoring	
	c. Post-control monitoring	
	d. Additional water management requirements	
	e. Pre-hatch work	
	2. Adult Mosquito Populations	
	a. Monitoring for adulticiding	
	b. Further notes on complaint calls	
	c. Adult identification	
	d. Post-adulticide monitoring	

	C.	Standards for Physical Control	
		1. Source Elimination	
		a. Tires	
		b. Blocked drainage	
		c. Residential problems	
		d. Drainage basin design	
		2. Source Maintenance	
		a. Stormwater runoff and ditch maintenance	
		b. Saltmarsh ditching	
		c. Waste disposal	
		3. Source Reduction	
		Open marsh water management Freshwater wetlands	
		c. Cattail control	
	D	Standards for Biological Control	
	υ.	Larvivorous fish	
		Other biological control agents	
	E	Standards for Public Noltification, Public Awareness and Education	
		Public Notification	
		Public Awareness and Education	
		3. Staff Development	
	F.	Standards for EEE Monitoring and DPH Liason	
		1. Role of programs in EEE Surveillance	
		2. Standard Operating Procedures during EEE Problem.	
VIII.		SUMMARY AND RECOMMENDATIONS	245-250
IX.	WR	RITTEN COMMENTS ON GEIR	251
	۸	Comments on Notice of Project Change (1996).	
		Comments on Spring 1997, Rough Draft.	
		Comments on Final Rough Draft (1997-98).	
		-	
X.	LIT	ERATURE CITED	252-260
API	PEN	DICES:	
	A.	Questionnaires, 1986 and 1996	261
	B.	DPH EEE Program	262-269
	C.	Sample Labels and Material Safety Data Sheets for pesticides currently in use	270
	D.	North East Massachusetts MCP Standards for Open Marsh Water Management	271
	E.	Stormwater Management	272-274
	F.	North East Massachusetts MCP Standards for Ditch Maintenance	275
		Educational Flyers about Mosquito Control	276
	H.	Preparer qualifications	277-278